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(19) JAPANESE PATENT OFFICE

PATENT ABSTRACTS OF JAPAN

(11) Publication number: 07060581 A

(43) Date of publication of application: 07.03.95

(51) Int. Cl
B23Q 1/44
B23Q 5/28
G01N 1/00
G12B 5/00
H01L 21/027
// G01N 1/28
G01N 37/00

(21) Application number: 05215967

(22) Date of filing: 31.08.93

(71) Applicant: SHIMADZU CORP

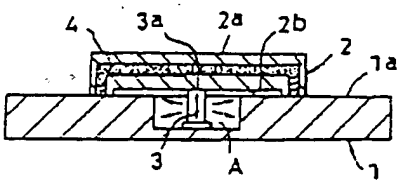
(72) Inventor: KONISHI IKUO

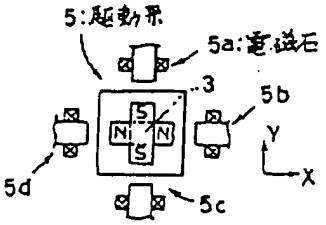
(54) X-Y STAGE

(57) Abstract:

PURPOSE: To miniaturize a stage total unit by enabling a slide table, having a degree of freedom in two axial directions along an upper surface of a base table, to move in a two-dimensional direction by a single drive system constituted of a contactor and its moving mechanism.

CONSTITUTION: This X-Y stage is mainly constituted of a base table 1, slide table 2 placed on an upper surface 1a of the base table and a drive system 5 containing a contactor 3, and a permanent magnet 4 is buried in the slide table 2. The contactor 3 is a piezoelectric element of structure extended/ contracted in a vertical direction and arranged in a recessed part A provided in a central part of the base table 1, to lift the slide table 2 when extended. Four side part corners of the contactor 3 are magnetized, to arrange respective electromagnets 5a to 5d opposed to each magnetized location, and by controlling electrification to each of these electromagnets 5a to 5d, the contactor 3, that is, the slide table 2 can be moved to an arbitrary position in an X-Y plane.





(19) JAPANESE PATENT OFFICE

PATENT ABSTRACTS OF JAPAN

(11) Publication number: 07131966 A

(43) Date of publication of application: 19.05.95

(51) Int. Cl H02K 33/16
H02K 41/02

(21) Application number: 05276697

(22) Date of filing: 05.11.93

(71) Applicant: SHARP CORP

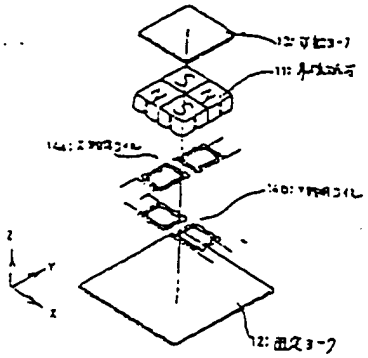
(72) Inventor: YAMADA MASANORI

(54) TWO-DIMENSIONAL LINEAR MOTOR

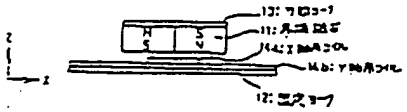
(57) Abstract:

PURPOSE: To reduce the size and weight of an X-Y stage using a two-dimensional linear motor while its enough strokes are secured, by constituting the field magnet of the motor through arranging alternately the N poles and S poles of its constituent magnets in the form of a matrix along the orthogonal two axes of the driving shafts of the motor, and by providing respective coils corresponding to the driving shafts orthogonally to each other.

CONSTITUTION: In a field magnet 11 of a two-dimensional linear motor, magnets are fixed in the form of a matrix while their N poles and S poles alternate with each other. In the lower part of the gap present between the field magnet 11 and a static yoke 12 of the linear motor, X-axis coils 14a and Y-axis coils 14b which correspond to the orthogonal two axes of the linear motor and are the primary side coils of the linear motor are provided orthogonally to each other. By the secondary side magnetic fields generated through the field magnet 11, and by the primary side currents flowing respectively in the directions of the longitudinal sides of the X-axis coils 14a and Y-axis coils 14b, the thrusts of the linear motor are generated respectively in the respective X and Y directions, according to Fleming's left-hand rule. The magnitudes and directions of the thrusts are determined respectively by the magnitudes and directions of the primary side currents. Thereby, the enough strokes of an X-Y stage using the two-dimensional linear motor can be secured, and concurrently the size and weight of the X-Y stage can be reduced.

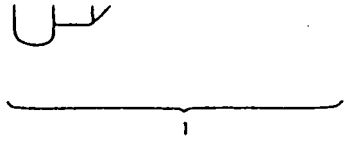


(a)



(b)

flow through the exciting coils. Next, the limitation stator 11 is moved by a small distance within the pitch of the teeth 15 by the actuators 12 to 14 of a fine adjustment mechanism 1 and the stage 19 is moved in such a manner as following the stator 11 so that the stage 19 is stably positioned. The stage is thus positioned at a high speed and with a high accuracy.



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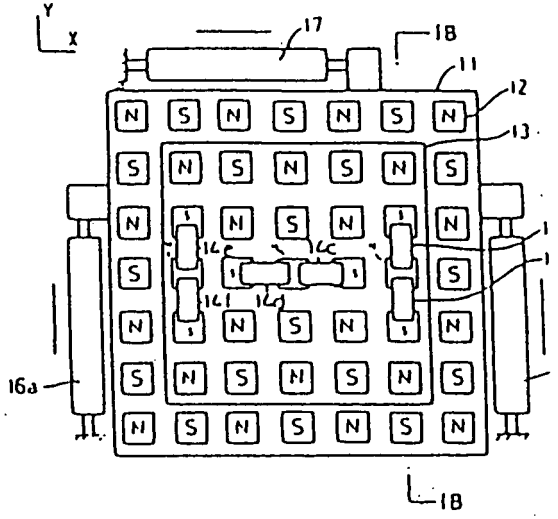
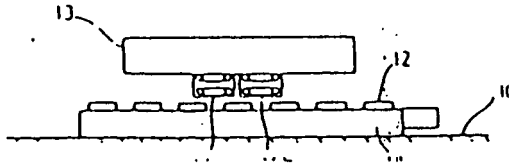
(54) TWO-DIMENSIONAL MOTOR TYPE STAGE DEVICE
(11) 3-178747 (A) (43) 2.8.1991 (19) JP
(21) Appl. No. 64-317013 (22) 6.12.1989
(71) SUMITOMO HEAVY IND LTD (72) YOSHIYUKI TOMITA(2)
(51) Int. Cl⁵. B23Q5/28,B23Q1/18,H02K41/03





PURPOSE: To obtain an extremely high precision by arranging a number of permanent magnets into the form of a matrix on the surface of a yoke while alternately inverting their polarities, and supporting a stage on the upper surface thereof by means of an air bearing, and moving the stage by means of a Lorentz force generated by coil currents.

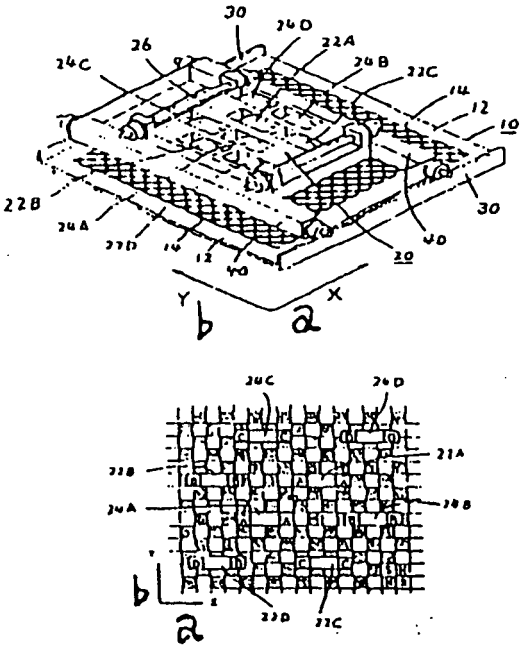
CONSTITUTION: On the surface of a yoke 11 a number of permanent magnets 12 are arranged into the form of a matrix while their polarities are alternately inverted, and the coils 14a to 14f of a stage 13 are supported by an air bearing, etc., and disposed in a position where lines of magnetic force from the number of permanent magnets 12 are kept roughly perpendicular to the yoke 11. When currents are made to pass through the coils 14a to 14f Lorentz forces acting on the coils act roughly perpendicular to the coils and the lines of magnetic force, whereby the stage 13 is moved to a desired position on the surface of the yoke 11 and positioned. The two-dimensional stage of high precision is thus obtained.

(54) DRIVING METHOD FOR SURFACE ACTUATOR

(11) 4-125055 (A) (43) 24.4.1992 (19) JP
(21) Appl. No. 2-243267 (22) 13.9.1990
(71) SHIN ETSU CHEM CO LTD(1) (72) DAIKI EBIHARA(1)
(51) Int. Cl⁵. H02K41/03

PURPOSE: To enable movement at a short distance by directly moving a moving piece in the oblique (45° and 135° in the X axis) direction.

CONSTITUTION: A moving piece is composed of core coils 22A (A phase), 22B (B phase), 22C (C phase) and 22D (D phase). The magnetic poles of the B phase and C phase of the core coils 22A-22D are arranged separated by P·n±P/4 (P represents the pitches of magnetic poles disposed in a latticed shape of a stator and (n) a positive integer) in the X axis and Y-axis directions respectively to the magnetic pole of A phase, and D phase is disposed separated by P·n±P/4 respectively in the X axis and Y axis directions to A phase. When B phase is excited, the moving piece 20 is shifted in the X axis direction only by P/4. When C phase is excited, the moving piece 20 is moved in the Y axis direction only by P/4. The moving piece 20 is shifted by approximately one third of an oblique travel at an angle of 45° in the X direction from the position of A-phase excitation by ABC phase simultaneous excitation. The moving piece is moved forward by approximately one third further in the same direction by BCD phase simultaneous excitation, and lastly the moving piece is located at a final position by D phase excitation.



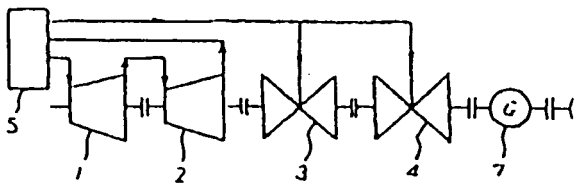
a: X-axis, b: Y-axis

(54) POWER GENERATION FACILITY

(11) 4-125056 (A) (43) 24.4.1992 (19) JP
(21) Appl. No. 2-242495 (22) 14.9.1990
(71) TOSHIBA CORP (72) MASANORI SHIN
(51) Int. Cl⁵. H02K55/04,H02P9/14

PURPOSE: To make the capacity of a power generation facility smaller than that of an ultra-high speed responding excitation type superconducting generator conducting quick excitation control by dividing a generator into one for fluctuating load and one for basic load.

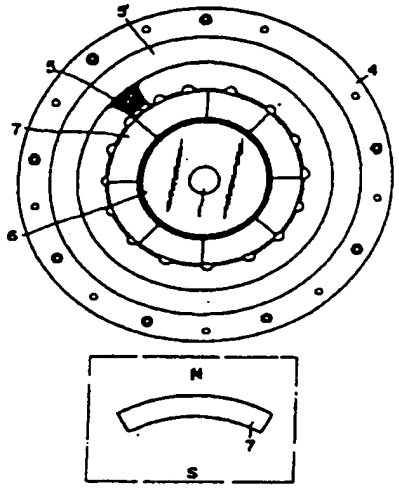
CONSTITUTION: An ultra-high speed responding excitation type superconducting generator GE6 and a conventional type GE7 are connected in tandem. Since the inductance of the field winding 8 of the GE7 is large and a time constant is long, a low-speed AVR8 conducting only slow excitation control in the extend of load follow-up is



(54) FORMATION OF ANISOTROPIC ANNULAR FERRITE MAGNET FOR BICYCLE GENERATOR
(11) 57-59461 (A) (43) 9.4.1982 (19) JP
(21) Appl. No. 56-127777 (22) 17.8.1981
(71) SHIYOUKICHI KUMAKURA (72) SHIYOUKICHI KUMAKURA
(51) Int. Cl³. H02K21/06,H01F7/02,H02K15/02

PURPOSE: To increase the generating capability of a bicycle generator and to reduce the weight of the generator by alternately polarizing the outer periphery of the anisotropic circular-arc-shaped magnetic pieces formed in the radial parallel magnetic field, and then arranging fixedly the magnetic pieces along the outer surface of an annular core.

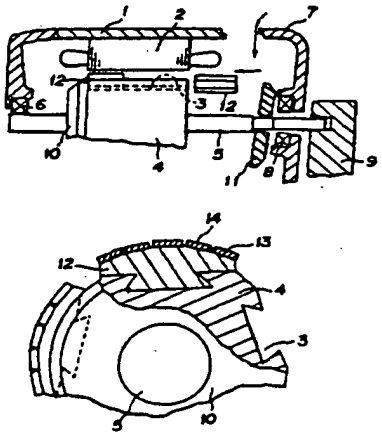
CONSTITUTION: N-poles and S-poles are alternately polarized on the outer periphery of an anisotropic circular-arc-shaped ferrite magnet pieces 7 having radial anisotropy formed in a parallel magnet field, the magnetic pieces 7 are annular arranged along the outer periphery of a plurality of annular cores 6, and are integrally secured to the core 6, for example, with adhesive.



(54) ASSEMBLING METHOD FOR ROTARY ELECTRIC MACHINE
(11) 57-59462 (A) (43) 9.4.1982 (19) JP
(21) Appl. No. 55-131461 (22) 24.9.1980
(71) MEIDENSHA K.K. (72) TAKASHI TODA
(51) Int. Cl³. H02K21/08,H02K15/02

PURPOSE: To prevent the difficulty of assembling a rotary electric machine due to the electromagnetic force produced owing to the unbalance of a gap by forming an engaging axial gap on the surface of a rotor core inserted and supported in a stator core and inserting the mounting piece mounting a permanent magnet into the engaging groove.

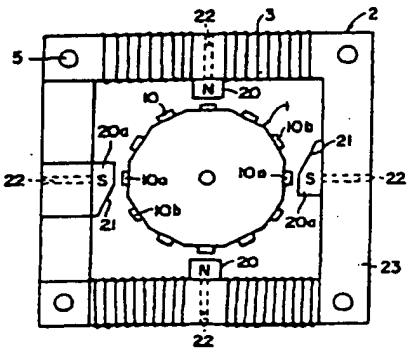
CONSTITUTION: A stator core 2 is mounted in a casing 1, a rotor core 4 having a plurality of engaging grooves 3 axially along the surface is inserted through a suitable gap into the core 2, the one end of the shaft 5 is supported by the bearing 6 of a casing 1, and is supported by the bearing 8 of a cover 7 at the other end to a gap holding support 9. Then, a mounting piece 12 mounting a plurality of permanent magnets 14 on the surface 13 is inserted between the casing 1 and the cover 7, is inserted slidably from the axial direction of the rotor core 4, is engaged with all the engaging grooves 3, a clamp 11 is urged fixedly to the end face of the piece 12, and the cover 7 is eventually connected to the casing 1.



(54) SYNCHRONOUS MOTOR
(11) 57-59463 (A) (43) 9.4.1982 (19) JP
(21) Appl. No. 55-134030 (22) 26.9.1980
(71) TOMOKI EBIHARA(1) (72) TOMOKI EBIHARA
(51) Int. Cl³. H02K21/14

PURPOSE: To enable the self-excitation of a synchronous motor and to shorten the axial length of the motor by mounting a permanent magnet to a rotor, forming a stator of a frame structure, and forming the poles of the stator of the prescribed shape.

CONSTITUTION: Permanent magnets 10 are so mounted as to become alternately different polarity at the respective sides of a rotor 1 made of soft iron material of regularly polygonal shape, and a stator 2 of frame shape is provided on the outer periphery of the rotor 1. Magnetic poles 20 are provided at the positions faced with the rotor 1 of the frame 23 of the stator 2, extending surface 21 having the prescribed gradient is formed at least a pair of facing poles 20a of the poles 20, and a slit 22 is formed at the position corresponding to the pole 20 on the frame 23. In this manner, since the poles 20a simultaneously attract and repel a pair of adjacent permanent magnets 10 at the starting time, self-excitation is enabled.



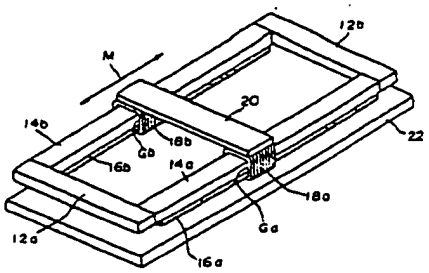
(5)

20 F 464

(54) LINEAR DC MOTOR
(11) 61-167368 (A) (43) 29.7.1986 (19) JP
(21) Appl. No. 60-6476 (22) 17.1.1985
(71) SHINKO ELECTRIC CO LTD(1) (72) ATSUJI KARITA(1) EBIHARA
(51) Int. Cl⁴. H02K33/18

PURPOSE: To improve the characteristic of a linear DC motor by mounting a pair of cores in parallel, magnetizing both cores in reverse polarity, and mounting a movable coil around the core to form a closed magnetic circuit, thereby equalizing the distribution of an effective magnetic flux density.

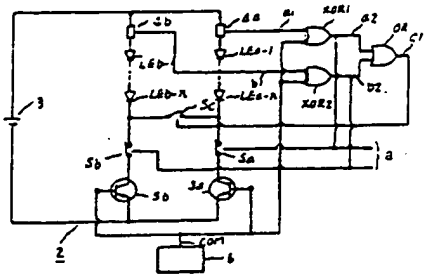
CONSTITUTION: A pair of cores 14a, 14b are disposed in parallel, and permanent magnets 16a, 16b are mounted so that one of the cores 14a, 14b become an N-pole and the other becomes an S-pole. Movable coils 18a, 18b are mounted through the prescribed air gaps Ga, Gb at least one of the cores 14a, 14b. In order to form a closed magnetic circuit of the magnetic flux acting on the coil 18, a backiron 22 and yokes 12a, 12b are, for example, provided. Thus, the stroke length of the coil 18 can be increased, and the magnetic flux acting on the coil 18 can be equalized over the entire length.



(54) GATE SIGNAL GENERATOR OF THYRISTOR CONVERTER
(11) 61-167369 (A) (43) 29.7.1986 (19) JP
(21) Appl. No. 60-5727 (22) 18.1.1985
(71) HITACHI LTD (72) RYUJI IYOTANI(1)
(51) Int. Cl⁴. H02M1/00,H02M1/092

PURPOSE: To obtain a gate signal generator having high reliability and good rising characteristic by dividing light emitting elements into two sets, connecting semiconductor switches in series, and continuing the operation with the other when one becomes defective.

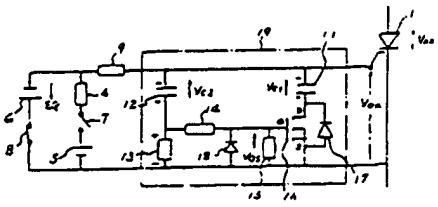
CONSTITUTION: When a light emitting element and a photoreceptor are associated as a circuit for supplying a gate signal of a thyristor, a plurality of light emitting elements LE are divided into two sets (LEa, LEb). The first switches Sa, Sb and semiconductor switches 5a, 5b are connected in series in the set of the light emitting elements, and the second switch Sc are connected between both sets of the light emitting elements. The switches Sa, Sb are closed in the normal state, and if the defect of any one switch 5a or 5b is detected, the first switch of the defective side is opened, and the second switch Sc is closed to continue the operation only with the healthy switch.



(54) DISPLACEMENT CURRENT ABSORBER OF STATIC INDUCTION THYRISTOR
(11) 61-167370 (A) (43) 29.7.1986 (19) JP
(21) Appl. No. 60-6496 (22) 17.1.1985
(71) TOYO ELECTRIC MFG CO LTD (72) YUTAKA KAWAMURA
(51) Int. Cl⁴. H02M1/08

PURPOSE: To prevent the voltage value of a gate reverse bias from decreasing by connecting a switching element controlled by the variation in a gate voltage and a capacitor between the gate and the cathode of an SI thyristor.

CONSTITUTION: A capacitor 11 and a switching element 16 are connected in series between the gate and the cathode of a static induction thyristor (SI thyristor), a diode 17 is provided in parallel with the element 15, and the capacitor 11 is charged by the reverse bias voltage of the gate of the thyristor 1. A gate voltage detector of the SI thyristor made of a capacitor 12 and a resistor 13 is provided. A switching element 16 is controlled by the output of the gate voltage detector to discharge the capacitor 11.

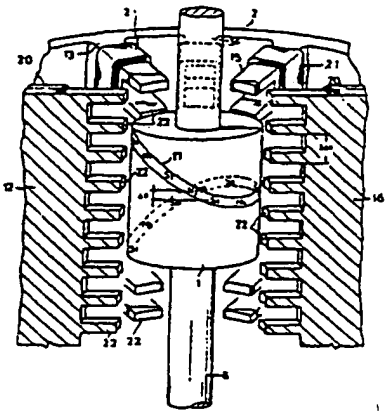


(6)

(54) STEPPING MOTOR
(11) 61-173659 (A) (43) 5.8.1986 (19) JP
(21) Appl. No. 60-13763 (22) 28.1.1985
(71) TOKYO ELECTRIC CO LTD (72) DAIKI EBIHARA(1)
(51) Int. Cl⁴. H02K37/00

PURPOSE: To enable to convert the rotary motion of a rotor into a linear motion of an output shaft by slidably passing the output shaft to a bearing for rotatably supporting the output shaft for supporting the rotor.

CONSTITUTION: A stepping motor is operated by sequentially switching the excitations of salient poles 12~19 of its stator 2 and a layer of windings 20, 21, the poles of a rotor 1 are magnetically attracted to oppose to the excited layer, and the rotor 1 is rotated at a certain step angle. Whenever the rotor 1 is rotated at one step angle by the magnetic attraction simultaneously upon rotating, the rotor 1 is attracted to the outer periphery, and moved in the same amount as a pitch along the axial direction of the rotor shaft between adjacent poles. Thus, since the rotor 1 axially moves upon rotating, the output shaft 5 for supporting the rotor 1 and slidably passing the bearing is linearly moved.

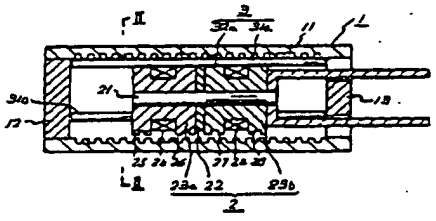


11: magnetizing zone. 13,15: salient pole. 22 teeth

(54) LINEAR PULSER MOTOR
(11) 61-173660 (A) (43) 5.8.1986 (19) JP
(21) Appl. No. 60-13154 (22) 26.1.1985
(71) OMRON TATEISI ELECTRONICS CO (72) KAZUO TSUBOI(1)
(51) Int. Cl⁴. H02K41/03,H02K33/18

PURPOSE: To simplify working and assembling by disposing a guide mechanism between the inner surface of a cylindrical stator and the outer surface of a movable element, thereby omitting special parts such as a guide shaft and a bearing.

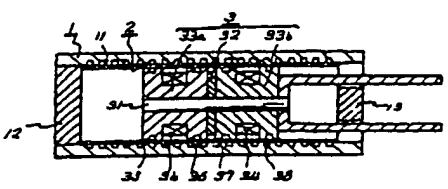
CONSTITUTION: A plurality of guide pins 31a~31c are disposed on the inner surface of a cylindrical stator 1, guide grooves 32a~32c corresponding to and engaged with the pins are formed on the outer periphery of the element 1, and slidably engaged and supported. Thus, a guide shaft, a bearing and a bearing bush are omitted as compared with a conventional linear pulse motor using a linear ball bearing, the size, the number of parts, working and assembling steps of the motor are reduced to largely decrease its cost.



(54) CYLINDRICAL LINEAR PULSE MOTOR
(11) 61-173661 (A) (43) 5.8.1986 (19) JP
(21) Appl. No. 60-13155 (22) 26.1.1985
(71) OMRON TATEISI ELECTRONICS CO (72) HIROBUMI OTA
(51) Int. Cl⁴. H02K41/03,H02K33/18

PURPOSE: To simplify working and assembling by engaging a bearing member made of a nonmagnetic metal thin plate with the inner periphery of a cylindrical stator, and slidably supporting the outer periphery of a movable element, thereby omitting special parts such as a guide shaft and a bearing.

CONSTITUTION: A bearing member 2 bent substantially in a cylindrical shape from a nonmagnetic metal thin plate is engaged with the inner surface of a cylindrical stator 1, and a movable element 3 is slidably supported to the member 2. Thus, a guide shaft, a bearing and a bearing bushing are omitted as compared with a conventional linear pulse motor using a linear ball bearing, the size, the number of parts, working and assembling steps of the motor are reduced to largely decrease its cost.



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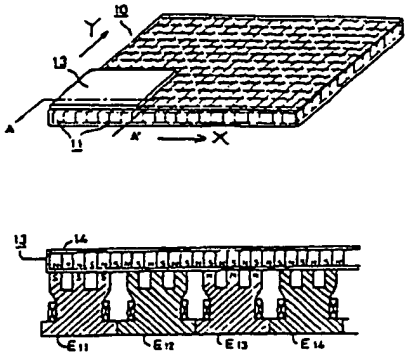
158 E 546

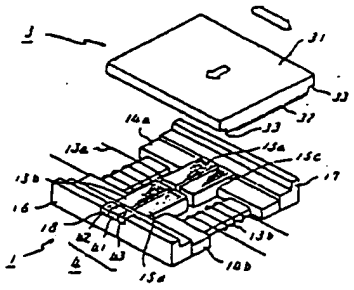
(54) FLAT MOTOR
(11) 62-100161 (A) (43) 9.5.1987 (19) JP
(21) Appl. No. 60-237116 (22) 23.10.1985
(71) SHIN ETSU CHEM CO LTD(1) (72) DAIKI EBIHARA(1)
(51) Int. Cl⁴. H02K41/02



PURPOSE: To miniaturize and simplify a device, and to simplify maintenance work by utilizing the interaction of a permanent magnet and an electromagnet and moving a body in the extent of a two-dimensional plane.

CONSTITUTION: Electromagnets 11 at each position in a stator 10 are magnetized at every other electromagnet, and the electromagnets 11 on lines except the nearest line also suck and hold a mover 13 and make it rest. When changing the direction of polarity of the electromagnets excited, the mover 13 is shifted only by an x×1/2 step in the direction of the arrow X and rests in the same manner as the electromagnets on the nearest line. The mover 13 is transferred only by a y×1/2 step in the direction of the arrow Y by altering the electromagnets 11 even in movement in the direction of the arrow Y. Accordingly, the mover 13 can be locomoted and made to rest at the steps of x/2 in breadth and y/2 in length on the surface of the stator 10 by repeating the operation of movement in said X and Y directions.

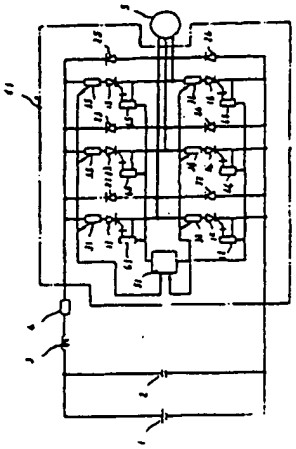
(54) PLATE-SHAPED LINEAR PULSE MOTOR
(11) 62-100162 (A) (43) 9.5.1987 (19) JP
(21) Appl. No. 60-239146 (22) 24.10.1985
(71) OMRON TATEISI ELECTRONICS CO (72) TETSUO MAEDA
(51) Int. Cl⁴. H02K41/03



PURPOSE: To eliminate the need for a special pre-load mechanism by conventional pre-load plate and spring by disposing moving pieces to traveling guides and a pre-loading magnetic attraction means to one traveling guide.

CONSTITUTION: With a magnetic attraction means 4, a magnetic unit in which magnetic poles 42, 43 are stuck integrally is mounted and fixed into a recessed section 18, aligning N and S magnetic poles for a permanent magnet 41 in the direction of traveling of a moving piece 3 and magnetic paths are formed among the N pole and S pole 41 and the end surfaces of both magnetic members 42, 43 and the moving piece 3. The moving piece 3 is pre-loaded to a traveling guide 16 at predetermined pressure at all times by suction force by the magnetic attraction means 4 disposed to the guide 16, and the guide 16 is made stably to travel as a traveling reference guide.

(54) PROTECTIVE DEVICE FOR GATE TURN-OFF THYRISTOR
(11) 62-100163 (A) (43) 9.5.1987 (19) JP
(21) Appl. No. 61-231193 (22) 1.10.1986
(71) HITACHI LTD (72) MASAYUKI HIROSE(1)
(51) Int. Cl⁴. H02M1/06,H03K17/72



PURPOSE: To protect a gate turn-OFF thyristor (GTO) from overcurrents without depending upon the fusing of a fuse, etc. by conducting gate turn-OFF by OFF pulses when the value of abnormal currents on a short-circuit failure, etc. extends over the controllable anode current value or less of the GTO even on abnormal currents.

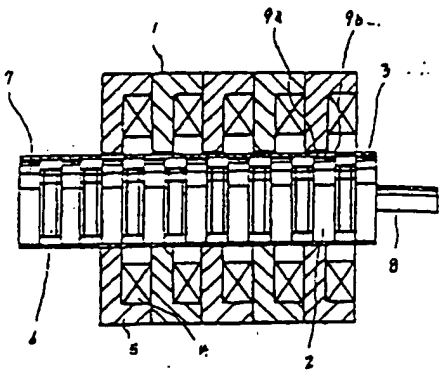
CONSTITUTION: When the anode currents of a GTO 11 abnormally increase and a current detector 31 outputs an abnormal-current decision signal, a gate control section 51 outputs an OFF-pulse generating signal to a gate pulse generator 41 for the GTO 11, the gate pulse generator 41 conducts the OFF pulses of the GTO 11 of abnormal currents, the GTO 11 is turned OFF after a certain time passes, and abnormal currents are interrupted. When anode currents after a certain time passes do not reach zero, ON pulses are conducted through GTOs 11~16 for an inverter section, the GTOs 11~16 are turned-OFF simultaneously, and abnormal currents are shunted.

114 E 605

(54) LINEAR PULSE MOTOR
(11) 62-262649 (A) (43) 14.11.1987 (19) JP
(21) Appl. No. 61-103855 (22) 8.5.1986
(71) SHIBAURA ENG WORKS CO LTD (72) TADASHI TAMAI(1) EBIHARA
(51) Int. Cl⁴. H02K41/03

PURPOSE: To smooth the movement of a moving substance and to facilitate the restriction in the rotational direction, by forming axial grooves to stator and moving substance so as to get them to face in the diametrical direction between the stator and the moving substance.

CONSTITUTION: A stator 1 of a linear pulse motor is cylindrically composed, on the inside diameter of which a pistonlike-shaped moving substance 2 is equipped and a metal 3 is equipped between the stator 1 and the moving substance 2. The stator 1 is composed so that iron cores wound over with winding 4 may axially be laminated. The moving substance 2 is composed so that permanent magnets 6 and iron cores 7 may be combined alternately. Axially long grooves 9a and 9b are respectively formed to the portion where the stator 1 faces the moving substance 2. The grooves 9a and 9b are composed so that they will turn into circular holes when they face the iron cores 5 of the stator 1 and iron cores 7 of the moving substance 2 respectively.

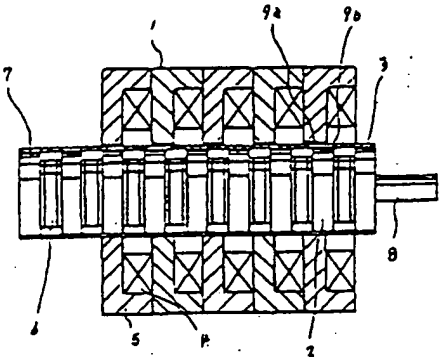


8: output shaft

(54) LINEAR PULSE MOTOR
(11) 62-262650 (A) (43) 14.11.1987 (19) JP
(21) Appl. No. 61-103856 (22) 8.5.1986
(71) SHIBAURA ENG WORKS CO LTD (72) TADASHI TAMAI(1)
(51) Int. Cl⁴. H02K41/03 EBIHARA

PURPOSE: To constitute a linear pulse motor rationally which is different in moving quantity, by laminating disc iron cores and disc permanent magnets in necessary quantity alternately in the axial direction to constitute a moving substance.

CONSTITUTION: A stator 1 of a linear pulse motor is composed cylindrically, on the inside diameter of which is equipped a moving substance 2 shaped like a piston. A metal 3 is equipped between the stator 1 and the moving substance 2. The stator 1 is composed of iron cores wound over with windings 4 laminated in the axial direction. The moving substance 2 is composed of disc permanent magnets 6 and disc iron cores 7 alternately combined and laminated. An output shaft 8 is equipped to the moving substance 2 to use the actuation of its movement.

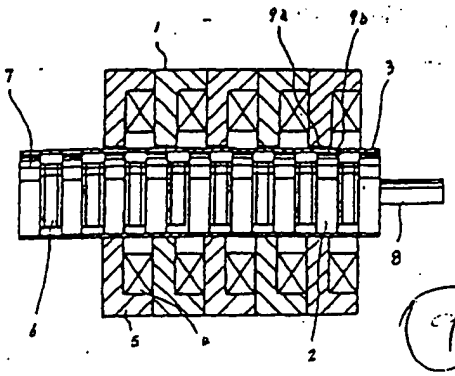


9a: groove, 9b: groove

(54) LINEAR PULSE MOTOR
(11) 62-262651 (A) (43) 14.11.1987 (19) JP
(21) Appl. No. 61-103857 (22) 8.5.1986
(71) SHIBAURA ENG WORKS CO LTD (72) TADASHI TAMAI(1)
(51) Int. Cl⁴. H02K41/03 EBIHARA

PURPOSE: To make the sliding characteristic of a moving substance prominent and to enable a motor to withstand the external force of the moving substrance sufficiently which is produced through an output shaft, by providing a metal sliding axially between a stator and the moving substance.

CONSTITUTION: A stator 1 of a linear pulse motor is composed cylindrically, on the inside diameter of which a pistonlike-shaped moving substance 2 is equipped. A metal 3 is equipped between the stator 1 and the moving substance 2. The metal 3 is constituted so as to slide along the inside diameter of the stator 1 and fixed to the outside circumference of the moving substance 2, together with which the metal 3 moves. The stator 1 is composed of iron cores

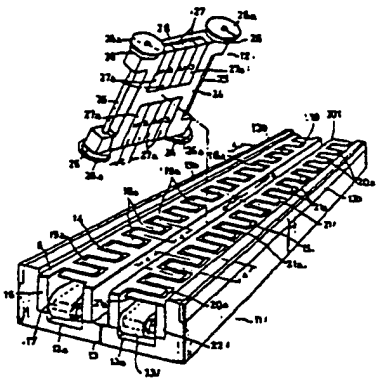


. 112 E 742

(54) LINEAR PULSE MOTOR
(11) 63-310361 (A) (43) 19.12.1988 (19) JP
(21) Appl. No. 62-145346 (22) 12.6.1987
(71) TOKYO ELECTRIC CO LTD (72) DAIKI EBIHARA(1)
(51) Int. Cl⁴. H02K41/03

PURPOSE: To reduce the weight of a movable chip, by producing a polarity corresponding to ah input pulse on a pole tooth through a stator and moving the movable chip linearly through magnetic reaction with magnetic pole of a permanent magnet arranged on the movable chip.

CONSTITUTION: A linear pulse motor is constructed with a stator 11 and a movable chip 12. The stator 11 is formed by fixing a pair of excitation units 14, 15 to a non-magnetic support 13 having an approximately C-shape where a pair of clearance grooves 13a are formed in longitudinal direction and rails 13b are provided. The excitation unit 14 is formed by winding an excitation coil 17 around the bottom wall of a yoke 16 and fixing pole plates 18, 19. The other excitation unit 15 is constructed similarly. The movable chip 12 comprises a body 24, an axle 25 and a wheel 26, and a permanent magnet 27 is fixed thereto while facing pole plates 18a~21a. Since no electromagnet is required for the movable chip 12, the weight of the movable chip 12 can be reduced.

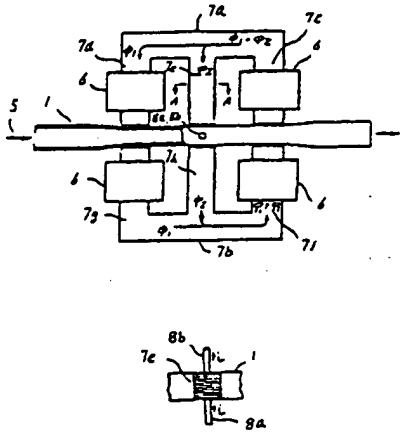


20: pole plate. 21: pole plate. 22: yoke. 23: excitathon coil. 27a : pole face

(54) ELECTROMAGNETIC PUMP
(11) 63-310362 (A) (43) 19.12.1988 (19) JP
(21) Appl. No. 62-145083 (22) 12.6.1987
(71) HITACHI LTD (72) YOSHIHIKO SATO(3)
(51) Int. Cl⁴. H02K44/04

PURPOSE: To prevent complication of electomagnetic pump, by arranging magnetic poles for flow measurement where magnetic pole and magnetic circuit are shared in order to apply driving force onto Na in a duct of the electomagnetic pump closely to the duct in the vicinity of Na drive pole.

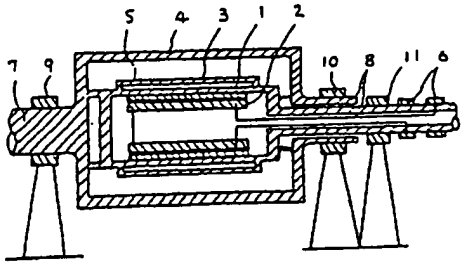
CONSTITUTION: An electromagnetic pump comprises a duct 1, Na5 flowing therethrough, a magnetic pole 7 and a coil 6. The magnetic pole 7 is additionally provided with magnetic poles 7e, 7h for flow measurement and formed into an E-shaped pole. The magnetic pole 7 is splitted into horizontal poles 7a, 7b and poles 7c, 7d, 7f, 7g for applying driving force onto Na5 in the duct 1. The flow measurement pole 7e is positioned between the driving poles 7c, 7d and provided in pair with a pole 7h. Upon supply of current to respective coils 6, field (flux densities ϕ_1, ϕ_2) is produced in the pole. Voltage corresponding to flow quantity Na5 can be taken out from flow measurement electrodes 8a, 8b based on the flux density ϕ_2.



(54) ROTOR FOR SUPERCONDUCTING ROTARY MACHINE
(11) 63-310363 (A) (43) 19.12.1988 (19) JP
(21) Appl. No. 62-145108 (22) 12.6.1987
(71) HITACHI LTD (72) MASANORI KAMIMASU(1)
(51) Int. Cl⁴. H02K55/04

PURPOSE: To improve reliability, by arranging a damper winding employing superconducting wire material having high resistance against variation of magnetic field in a rotor.

CONSTITUTION: Rotor for superconducting rotary machine is constructed with a torque tube 1, a superconducting field winding 2, an inside damper 3, an outside damper 4, a slip ring 6 for superconducting field winding, etc., and shafts 7, 8 thercof are supported at the opposite ends by bearings 9—11. The winding 2 is formed with DC superconducting wire material. A damper winding 5 made of superconducting wire material having high resistance against variation of field is provided. Consequently, penetration of AC transient field into the superconducting field winding 2 can be prevented, like the inside and outside dampers 3, 4, resulting in prevention of quenching in the winding 2.

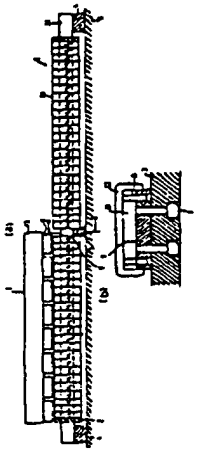


10

(54) LINEAR MOTOR
(11) 2-168845 (A) (43) 28.6.1990 (19) JP
(21) Appl. No. 63-322384 (22) 20.12.1988
(71) NTN CORP (72) TADAO YONEDA(1)
(51) Int. Cl⁵. H02K41/03

PURPOSE: To increase the rigidity of core and to reduce deformation of core by arranging at least one foot at the intermediate section of core at fixed section then securing the core at least three points including the opposite ends to a fixing base.

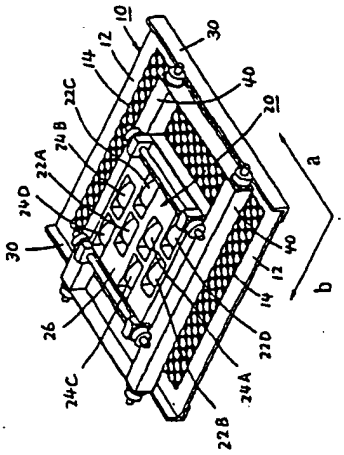
CONSTITUTION: Opposite ends of a core 21 are secured through spacers 4 to a fixing base 3 to provide an empty section Y wound with no coil 22 in the central section of the core 21, then a foot 5 is fixed with a screw 6 and further secured through a screw 7 to a base 3.



(54) DIRECT DRIVE SURFACE ACTUATOR
(11) 2-168846 (A) (43) 28.6.1990 (19) JP
(21) Appl. No. 63-319886 (22) 19.12.1988
(71) SHIN ETSU CHEM CO LTD(1) (72) DAIKI EBIHARA(1)
(51) Int. Cl⁵. H02K41/03

PURPOSE: To enable direct driving of a mover in two perpendicularly crossing directions by providing a stator to be arranged with a plurality of permanent magnets in grid and the mover having four-phase core coils, and arranging the magnetic poles of three-phases at specific distances in the direction of X and Y axes with respect to the remaining phase.

CONSTITUTION: A stator 10 has a plurality of permanent magnets and guide rails 30, 40 while a mover has first and second core coil groups 22A-D(A-D phase), 24A-D(A-D phase), where the magnetic poles of B, C and D phases in the first and second groups are separated in the directions of X and Y axes by $p \cdot n \pm p/4p$ from the magnetic pole of phase A. Motion in the direction of X-axis is activated through excitation of phases A and B or phases C and D while motion in the direction of Y-axis is activated through excitation of phases A and C or B and D. By such arrangement, the mover can be driven directly in two perpendicularly crossing directions.

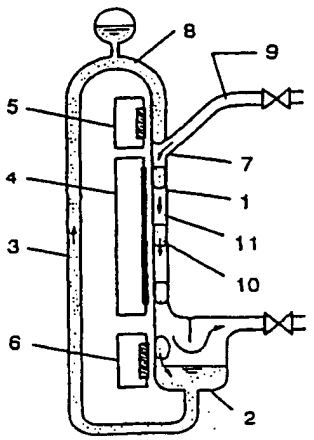


a: X-axis, b: Y-axis

(54) PUMP AND COMPRESSOR UTILIZING MAGNETIC FLUID
(11) 2-168847 (A) (43) 28.6.1990 (19) JP
(21) Appl. No. 63-324307 (22) 22.12.1988
(71) YASUO SATO (72) YASUO SATO
(51) Int. Cl⁵. H02K44/02, H02P7/00

PURPOSE: To eliminate mechanically movable section and to enable long time operation under severe conditions by forming an enclosed loop of magnetic fluid and flowing the fluid with external magnetic force thereby carrying and pressurizing the fluid to be transported by means of the magnetic fluid.

CONSTITUTION: A fluid system comprises a pressurizing cylinder 1, magnetic fluid 8, a separator 2 for separating the fluid 9 to be transported and a return pipe 3 for the fluid 8. A drive control system comprises a linear motor 4 for moving the fluid 8, a magnetic valve 5 for c ntrolling the flow and the pressure of the fluid 8 and a magnetic pole 6 for promoting separation of the fluids 8, 9. By such arrangement, no mechanically movable section is required and long time operation can be carried out under severe conditions of plant handling noxious material.

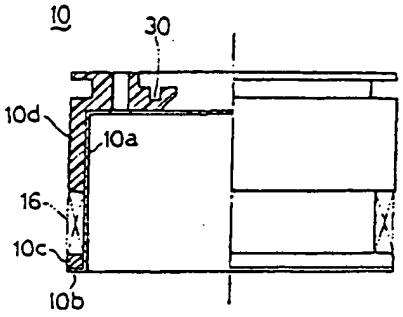


90 E 1145

(54) LINEAR MOTOR COMPRESSOR FOR STIRLING REFRIGERATOR
(11) 3-215158 (A) (43) 20.9.1991 (19) JP
(21) Appl. No. 2-9230 (22) 17.1.1990
(71) DAIKIN IND LTD (72) KATSUHIKO YAMADA(3)
(51) Int. Cl⁵. H02K33/18,F04B31/00,F25B9/14,H02K3/46

PURPOSE: To prevent a covered copper wire from being damaged by wearing against a spacer or a cap by winding a coil on the bobbin main body between the spacer and the cap set on the bobbin body.

CONSTITUTION: The coil of a linear motor is wound between the spacer 10c made of resin and the cap 10d set on the periphery of the bobbin main body 10a. Therefore, even if it contacts with the spacer 10c made of resin or the cap 10d in the condition that the covered copper wire is given tension when being wound, it is relaxed to rub strongly against them, and the generation of the insulation inferiority of the coil 16 is prevented.

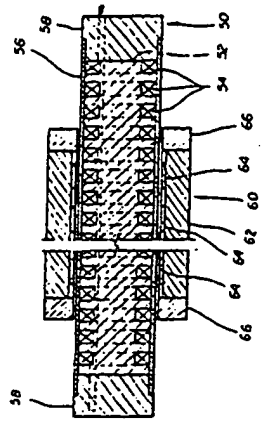


(54) TUBULAR LINEAR PULSE MOTOR
(11) 3-215159 (A) (43) 20.9.1991 (19) JP
(21) Appl. No. 2-7141 (22) 18.1.1990
(71) SHIBAURA ENG WORKS CO LTD(1) (72) HIROAKI NISHIYAMA(3)
(51) Int. Cl⁵. H02K41/03

EBIHARA

PURPOSE: To dispense with a linear bearing, which holds the main shaft holding a mover, by installing a tubular mover, where permanent magnets are fixed to the inside, on a columnar stator, where exciting windings are wound on the periphery, freely in sliding.

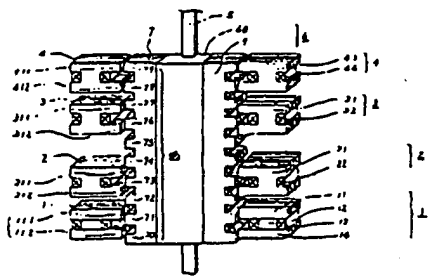
CONSTITUTION: A columnar stator 50 is composed of a yoke 52 made of magnetic material, an exciting winding 54 set in the circular groove formed in the yoke 52, a cover 56 of nonmagnetic substance, and a plug 58. A mover 60 has a cylinder frame of magnetic substance, a permanent magnet 64 fixed to the inside periphery, and guide members 66 fixed to both ends of the frame 62. To the inside periphery of the guide member 66 is applied coating of fleon resin so as to decrease the sliding resistance with the cover 56. The outside periphery of the cover 56 is coated with fleon resin after applying electrolytic plating so as to decrease sliding resistance.



(54) VERTICAL CARRIER
(11) 3-215160 (A) (43) 20.9.1991 (19) JP
(21) Appl. No. 2-60439 (22) 12.3.1990 (33) JP (31) 89p.203480 (32) 5.8.1989
(71) FUJI ELECTRIC CO LTD (72) TATSUO TAKE
(51) Int. Cl⁵. H02K41/03,B65G54/02,B66B9/02

PURPOSE: To prevent the fall of a carrier during power stoppage by giving upward driving force to the carrier by the principle of a reluctance motor, and besides providing a permanent magnetic in an exciting section.

CONSTITUTION: A carrier 6 is composed of a goods room 60, which travels with a vertical track 5 as a guide, and cores attached to both side. Exciting selections 1, 2, 3, and 4 are disposed repeatedly in opposition to the cores 7. The exciting section 1 is composed of an upper core 11 and a lower core 14, respectively arranged above and below a permanent magnet 12, and a demagnetizing coil 13 for negating the vertical magnetomotive force of the permanent magnet 12. The exciting sections 2, 3, and 4 become exiting conditions by currents flowing to exciting coils 22, 32, and 42, and the exciting section 1 is in exciting condition when a current is not flowing to the demagnetizing coil 13. Therefore, even during power stoppage, the carrier 6 by the excitation of the exciting section 1 does not fall.



12

5: vertical track, 21: core, 22: exciting coil, 2: exciting section, 111 and 112: teeth

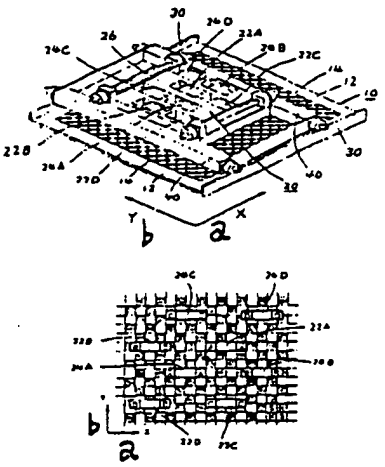
126 E 1249

(54) DRIVING METHOD FOR SURFACE ACTUATOR

(11) 4-125055 (A) (43) 24.4.1992 (19) JP
(21) Appl. No. 2-243267 (22) 13.9.1990
(71) SHIN ETSU CHEM CO LTD(1) (72) DAIKI EBIHARA(1)
(51) Int. Cl⁵. H02K41/03

PURPOSE: To enable movement at a short distance by directly moving a moving piece in the oblique (45° and 135° in the X axis) direction.

CONSTITUTION: A moving piece is composed of core coils 22A (A phase), 22B (B phase), 22C (C phase) and 22D (D phase). The magnetic poles of the B phase and C phase of the core coils 22A-22D are arranged separated by P·n±P/4 (P represents the pitches of magnetic poles disposed in a latticed shape of a stator and (n) a positive integer) in the X axis and Y-axis directions respectively to the magnetic pole of A phase, and D phase is disposed separated by P·n±P/4 respectively in the X axis and Y axis directions to A phase. When B phase is excited, the moving piece 20 is shifted in the X axis direction only by P/4. When C phase is excited, the moving piece 20 is moved in the Y axis direction only by P/4. The moving piece 20 is shifted by approximately one third of an oblique travel at an angle of 45° in the X direction from the position of A-phase excitation by ABC phase simultaneous excitation. The moving piece is moved forward by approximately one third further in the same direction by BCD phase simultaneous excitation, and lastly the moving piece is located at a final position by D phase excitation.



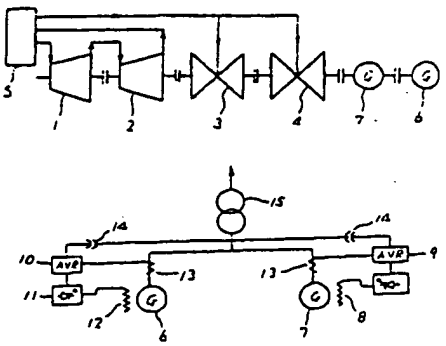
a: X-axis, b: Y-axis

(54) POWER GENERATION FACILITY

(11) 4-125056 (A) (43) 24.4.1992 (19) JP
(21) Appl. No. 2-242495 (22) 14.9.1990
(71) TOSHIBA CORP (72) MASANORI SHIN
(51) Int. Cl⁵. H02K55/04,H02P9/14

PURPOSE: To make the capacity of a power generation facility smaller than that of an ultra-high speed responding excitation type superconducting generator conducting quick excitation control by dividing a generator into one for fluctuating load and one for basic load.

CONSTITUTION: An ultra-high speed responding excitation type superconducting generator GE6 and a conventional type GE7 are connected in tandem. Since the inductance of the field winding 8 of the GE7 is large and a time constant is long, a low-speed AVR9 conducting only slow excitation control in the extend of load follow-up is installed. On the other hand, the GE6 has a high-speed AVR10 capable of applying high excitation voltage, controls the excitation currents of a field winding 12 through a thyristor converter 11 and compensates voltage. Since the GEs6, 7 are connected directly by a isolated-phase bus, two GEs6, 7 are connected in parallel electrically, and the voltage-drop section of the GE7 is compensated by an AVR10. Accordingly, the capacity of the ultra-high speed responding excitation type superconducting generator performing quick excitation control is reduced by dividing the generators into one for fluctuating load and one for basic load, thus making the output density of a generator group higher than that of one ultra-high speed responding excitation type superconducting generator.

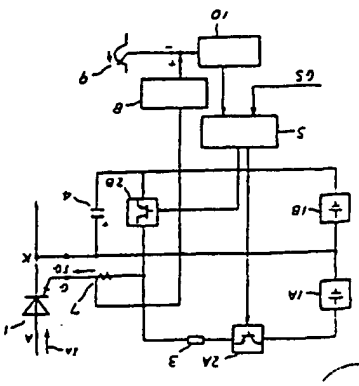


(54) GATE DRIVE FOR GATE TURN-OFF THYRISTOR

(11) 4-125057 (A) (43) 24.4.1992 (19) JP
(21) Appl. No. 2-243933 (22) 17.9.1990
(71) TOSHIBA CORP (72) OSAMU TANAKA
(51) Int. Cl⁵. H02M1/06,G05F1/10

PURPOSE: To prevent the breaking of a GTO by bringing a first switching means to an open state and a second switching means to a close state when the gate currents of the gate turn-off thyristor (GTO) reach overcurrents.

CONSTITUTION: When a fault such as a short circuit, grounding, etc., is generated in a power circuit, to which a GTO element 1 is connected, a second switch 2B is closed and negative gate currents are made to flow through a gate G from the cathode K of the GTO element 1 by a capacitor 4 charged when an OFF signal turning the GTO element 1 OFF is used as a gate signal GS from a control circuit. Gate currents are input to an anode-current computing element 8 in a gate current detector 7, an anode-current arithmetic value is output, and a deviation signal with the setting signal of an overcurrent setter 9 is input to an overcurrent decision device 10. When gate currents are decided to be overcurrents, an overcurrent signal is output to an ON-OFF control circuit 5, a first switch 2A is opened and the second switch 2B is closed.

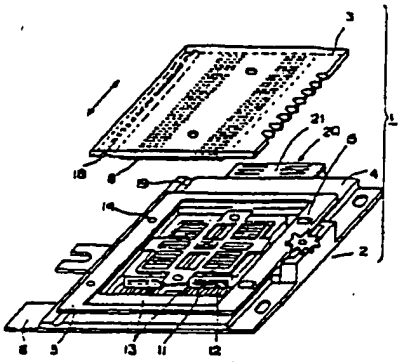


13

(54) LINEAR PULSE MOTOR
(11) 5-15138 (A) (43) 22.1.1993 (19) JP
(21) Appl. No. 3-183529 (22) 28.6.1991
(71) OMRON CORP (72) KEIJI TAKANO
(51) Int. Cl⁵. H02K41/03

PURPOSE: To provide a position detector which can inexpensively detect the relative positional relation between a needle and stator with a simple constitution without changing the structure of a linear pulse motor.

CONSTITUTION: This linear pulse motor is constituted of a stator 2 and needle 3 and an external position detector 20 is fitted to the side face of the stator 2 in the moving direction of the needle 3. The detector 20 is composed of a light emitting and receiving sections and detects the recessing and projecting sections of magnetic pole teeth 8 formed on the needle 3. Since the pole teeth 8 formed on the needle 3 are used as a scale, a linear pulse motor which is provided with an inexpensive position detecting mechanism having a simple constitution can be obtained.

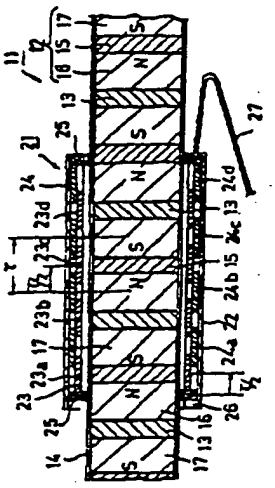


12

(54) BRUSHLESS LINEAR MOTOR
(11) 5-15139 (A) (43) 22.1.1993 (19) JP
(21) Appl. No. 3-288528 (22) 5.11.1991 (33) JP (31) 90p.299661 (32) 5.11.1990
(71) TOKYO ELECTRIC CO LTD (72) DAIKI EBIHARA(2)
(51) Int. Cl⁵. H02K41/03,H02K41/02

PURPOSE: To move a needle in the axial direction of a stator in a floating state by energizing the excitation coil of the needle in a prefixed excitation sequence so as to generate a magnetic absorbing and repulsing forces between both magnetic poles of the excitation coil and magnetic pole of the stator.

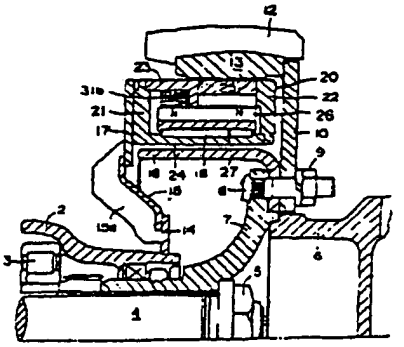
CONSTITUTION: A stator 11 is constituted by arranging stator modules 12 with spacers 13 in between and, at the same time, coating the outside of the module array with a material 14. Each module 12 is formed by putting a permanent magnet 15 between discoid magnetic poles 16 and 17 made of soft magnetic steel. Because of the magnet 15, N and S poles respectively appear at the magnetic poles 16 and 17. A cylindrical needle 21 which is slidable along the axial direction of the stator is put on the external surface of the stator 11. The needle 21 is provided with a back yoke 22, A-phase excitation coil 23, B-phase excitation coil 24, a pair of sliding rings 25 which act as a sliding section, and Hall element 26 which works as a position sensor and moves, for example, the printing head of a printer, etc.



(54) EDDY-CURRENT SPEED REDUCER
(11) 5-15140 (A) (43) 22.1.1993 (19) JP
(21) Appl. No. 3-183266 (22) 27.6.1991
(71) ISUZU MOTORS LTD (72) TOMOYUKI KUBOMIYA(3)
(51) Int. Cl⁵. H02K49/02

PURPOSE: To obtain an eddy-current type speed reducer which has a simple constitution, can be arranged in a fixed frame, and can make switching operation by means of the normal- and reverse-direction rotation of a magnetic supporting ring by utilizing the permanent magnet of the supporting ring.

CONSTITUTION: A cylindrical fixed frame 20 with a hollow section having a box-shaped cross section is arranged in a braking drum 12 connected with a rotating shaft 4. A large number of ferromagnetic bodies 25 are coupled with the outer cylindrical section 23 of the frame 20 facing the inner peripheral surface of the drum 13 at regular intervals in the peripheral direction. U-shaped permanent magnets 26 are coupled with a magnet supporting ring 27 which is rotatably supported in the hollow section of the frame 20 so that the polarities of the magnetic pole pairs of the magnets 26 facing each ferromagnetic body 25 can be alternately arranged in the peripheral direction. Electromagnets which are arranged in the peripheral direction so as to give a rotating force to the supporting ring 27 are coupled with the outer cylindrical section 20 of the frame 20 in corresponding to the permanent magnets 26.

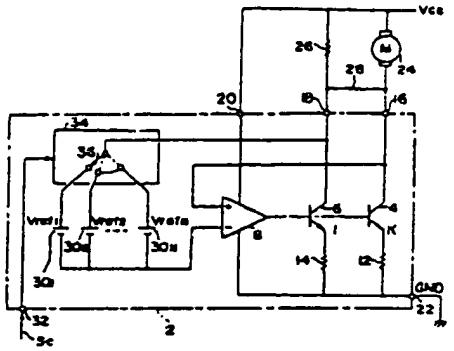


14

(54) ELECTRONIC GOVERNOR
(11) 61-273191 (A) (43) 3.12.1986 (19) JP
(21) Appl. No. 60-111884 (22) 24.5.1985
(71) ROHM CO LTD (72) JUNICHI HIKITA(1)
(51) Int. Cl⁴. H02P5/168

PURPOSE: To switch the rotating speed with a simple structure by enabling to switch a reference voltage set to an error amplifier.

CONSTITUTION: A reference current which corresponds to the drive current of a motor 24 flows to a resistor 26 provided in response to the internal impedance of a motor 24, a voltage produced by adding a voltage drop generated at the resistor 26 by the reference current and a reference voltage Vref of a voltage source 30 is applied to the inverting input terminal of an error amplifier 8, and the terminal voltage of the motor 24 is applied from the collector side of the transistor 4 is applied to the noninverting input terminal. The amplifier 8 controls the currents of the transistors 4, 6 in response to the difference of both of the inputs. A switch circuit 34 selects the reference voltages $Vref_1 \sim Vref_N$ to select the rotating speed of the motor 24.

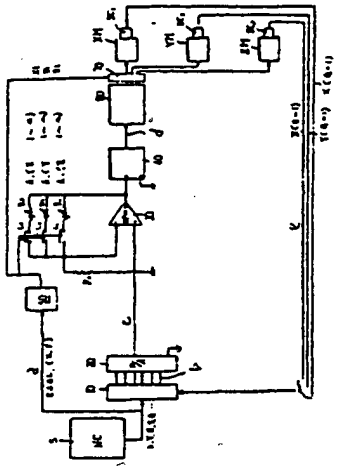


2: main controller, 30: reference voltage value

(54) MULTISHAFT MOTOR DRIVE CONTROL SYSTEM BY SPEED AMPLIFIER
(11) 61-273192 (A) (43) 3.12.1986 (19) JP
(21) Appl. No. 60-112500 (22) 24.5.1985
(71) ENSHU LTD (72) KAZUO KUBONO(2)
(51) Int. Cl⁴. H02P5/46

PURPOSE: To smoothly move a table irrespective of the magnitude of a machine and an unbalance of shafts by regulating the gain of a speed amplifier at each shaft unit.

CONSTITUTION: Resistors $R_1 \sim R_3$ are connected in parallel, the right end side is gathered to one, connected with the output terminal of a speed amplifier 30 to form a feedback circuit regarding the opening and closing operations of a contact to a negative terminal. The contacts $L_1 \sim L_3$ are closed at any L_1, L_2 or L_3 of one shaft selected by a relay circuit (a contact selector) 50 which inputs a shaft command signal of shafts (X, Y, Z,···) from an NC controller 5. That is, feedback gains from scale counters $SC_1 \sim SC_3$ of the shafts (X~Z) are obtained for sufficient responsiveness for the position command speed from the from the controller 5 by regulating the gain of the amplifier 30.

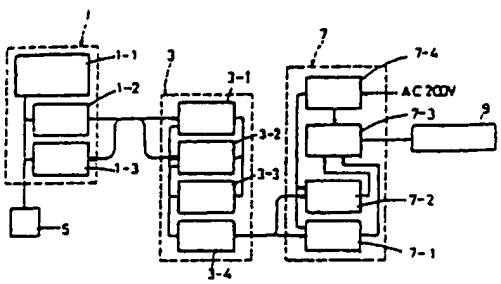


10: position counter, 40: address AMP, 60: servo AMP, XM: X-shaft motor, YM: Y shaft motor, ZM: Z-shaft motor, a: shaft command signal, b: position control signal, c: contact control signal, d: contact control signal, e: position feedback pulse (feedback gain)

(54) DRIVING METHOD OF LINEAR PULSE MOTOR
(11) 61-273193 (A) (43) 3.12.1986 (19) JP
(21) Appl. No. 60-113180 (22) 28.5.1985
(71) AMADA CO LTD (72) MASAYA WATADA(1)
(51) Int. Cl⁴. H02P7/00

PURPOSE: To reduce the variation in a thrust by selecting the optimum current waveform from a plurality of current waveforms preset in response to operating states in a real time.

CONSTITUTION: A plurality of current waveforms for operating smoothly a linear pulse motor in response to the operating states are stored in a memory of a central processing unit (CPU) 1. The CPU 1 outputs a command signal to a waveform generator 3 to output a current waveform corresponding to a signal representing the operating state of a detector 5. The output of the generator 3 is amplified by an amplifier 7, controlled by a power controller 7-3, and supplied to phase windings of a linear pulse motor 9. Thus, a method of driving a linear pulse motor with high positional accuracy and with less variation in a thrust irrespective of the operating states is provided.

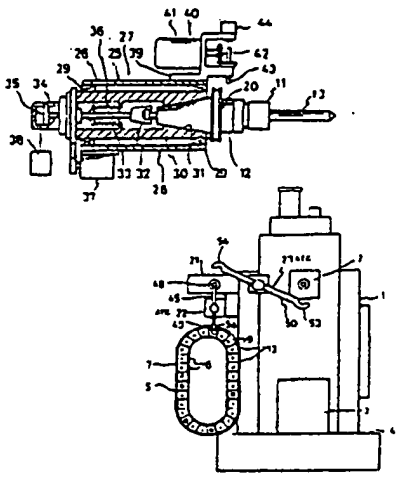


1-1: CPU substrate, 1-2: output port, 1-3: input port, 3-1: waveform memory, 3-2: input/output port, 3-3: sequencer, 3-4: D/A converter, 7-1,7-2: AMP, 7-4: low voltage unit

(54) MACHINING CENTER
(11) 62-88530 (A) (43) 23.4.1987 (19) JP
(21) Appl. No. 60-229478 (22) 15.10.1985
(71) TOSHIBA CORP(1) (72) AKIHIKO NO(3)
(51) Int. Cl⁴. B23Q3/155,B23P19/04

PURPOSE: To install a cutting edge part module onto a main shaft, after the assembly for a holder module, by installing the first tool replacing apparatus for replacing a cutting edge part module and the second tool replacing apparatus for replacing a modular tool.

CONSTITUTION: One clamper 48 is set oppositely to the cutting edge module 13 of a modular tool 11 after use which is installed onto a tool holding tool 27 by the turn of the tool replacing arm 45 of the first ATC 22, and the other clamper 49 is set oppositely to the cutting edge part module 13 to be next used. When the tool replacing arm 45 turns by 180°, the cutting edge part module 13 predetermined to be used is set oppositely to the tool holding tool 27, and the modular tool 11 is constituted. When the second ATC 23 operates, one clamper 53 is set oppositely to the modular tool after use which is installed onto a main shaft 2, and the other clamper 54 is set oppositely to the modular tool 11 predetermined to be used.

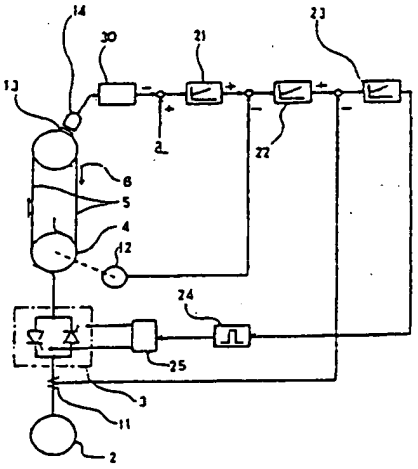


1: machining center body, 2: main spindle, 5: tool magazine

(54) CONSTANT POSITION STOPPING CONTROL DEVICE
(11) 62-88531 (A) (43) 23.4.1987 (19) JP
(21) Appl. No. 60-230604 (22) 16.10.1985
(71) FUJI ELECTRIC CO LTD (72) NARIHISA TOYOSHIMA(1)
(51) Int. Cl⁴. B23Q5/20

PURPOSE: To make it possible to cut off a resonant frequency caused by the interference between a mechanical system and a control system, by providing a filter between a position detecting means for detecting a predetermined stopping position of a driven member, and a position control loop for stopping a motor.

CONSTITUTION: When a position control loop is to stop a main shaft 6 to a predetermined position, the resiliency of a rubber belt 5 causes the interference between a mechanical system and a control system which produces resonant vibration having a frequency (fr). This resonant frequency is picked up by a position sensor 14 but is cut-off by a connected filter 30 whose cut-off frequency is set to (fr), and therefore is never transmitted to the next stage. Accordingly, the position control loop receives only a signal which is inherent to the control of position, and therefore the main shaft 8 may stop to the predetermined position, smoothly and rapidly.

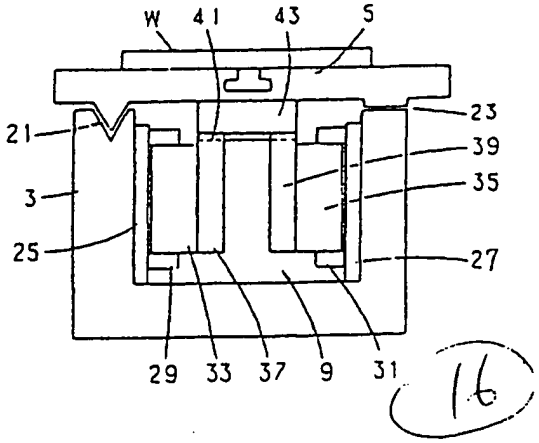


2: AC generator, 3: power converter, 4: DC motor, 11: converter, 12: speed transmitter, 13: magnetic piece, 21: position regulator, 22: speed regulator, 23: current regulator, 24: spark angle regulator, 25: gate drive circuit., a: zero signal

(54) TABLE DRIVE LINEAR MOTOR FOR MACHINE TOOL
(11) 62-88532 (A) (43) 23.4.1987 (19) JP
(21) Appl. No. 60-226925 (22) 14.10.1985
(71) AMADA CO LTD (72) SAKAE YAMAMOTO(2) WATABA
(51) Int. Cl⁴. B23Q5/28

PURPOSE: To make it possible to smoothly reciprocate a table, by connecting the primary sides of a linear motor with each other by means of a coupling member which allows the secondary side thereof to freely move in the directions orthogonal to the longitudinal directions of the secondary sides thereof but restrain their movements in the directions parallel to the longitudinal directions.

CONSTITUTION: In the upper section of a base 3 there is provided a table 5 on which a workpiece W is set and which is reciprocatable in the longitudinal direction thereof by means of right and left V-shape guide surfaces 21 and a flat guide surface 23. The secondary sides 25, 27 of a linear pulse motor 9 are arranged on the opposed inner vertical wall surfaces of the base 3, longitudinally of the base. The primary sides 33, 35 of the linear motor which are held by means of support mechanisms 29, 31 with a predetermined gap therebetween are coupled to a coupling member 43 through dove tail grooves 41 formed in the upper sections of attaching members 37, 39 attached to the rear surface of the primary sides. The coupling member 43 is attached to the lower surface of the table 5 which is therefore driven by the primary sides of the linear pulse motor, thereby the table may reciprocate on the base.



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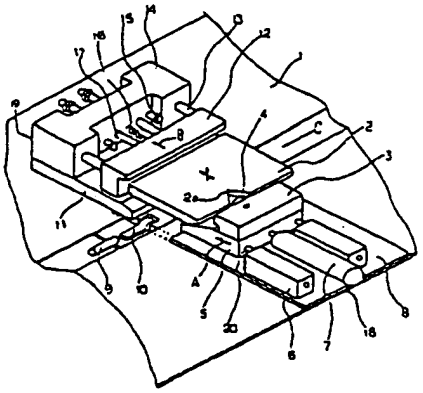
22 M 645

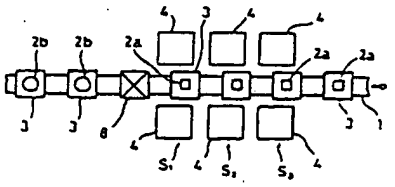
(54) POSITIONING DEVICE
(11) 62-136350 (A) (43) 19.6.1987 (19) JP
(21) Appl. No. 60-271425 (22) 4.12.1985
(71) HITACHI LTD (72) KATSUNORI NAKAJIMA
(51) Int. Cl⁴. B23Q39/04,B23P19/00

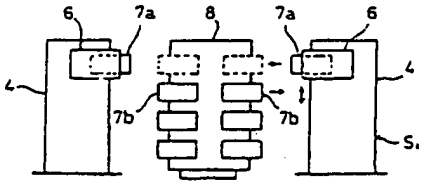


PURPOSE: To facilitate 3-axis directional positioning of a plate-shaped body placed in a specified position in a transfer passage in an assembly line by pressing the plate-shaped body by means of a movable tapered block on one side against a fixed tapered block on the other side.

CONSTITUTION: When a base plate 2 sent in the direction of C on a conveyer of a base machine 1 of an assembly line comes between a pressing mechanism 18 and a recciving mechanism 19, the base plate 2 is stopped with a stopper 10 actuated with an air cylinder 9. Under this condition, a block 5 and a flowing prevention block 3, by the actuation of an air cylinder 7, move in the direction of A to push up to base plate 2 along respective tapered surfaces of the block 5 and a fixed block 11 so that the base plate 2 is held between two floating prevention blocks 3 and 12 and is vertically positioned. When the cylinder 7 is further actuated, the floating prevention block 12, resisting a spring 16, moves in the direction of B to butt against a stopper 15, laterally positioning the base plate 2. Thus, the positioning can be performed easily and securely with higher space efficiency.

(54) AUTOMATIC MACHINE TOOL
(11) 62-136351 (A) (43) 19.6.1987 (19) JP
(21) Appl. No. 60-275836 (22) 6.12.1985
(71) AISAN IND CO LTD (72) YORIKAZU KAMIYA(1)
(51) Int. Cl⁴. B23Q41/00,B23Q3/155





PURPOSE: To make it possible to eliminate the need for arranging a tool magazine for every numerically controlled (NC) machining unit and simplify an entire device by changing tools by means of the NC machining unit while moving a tool pallet holding a tool.

CONSTITUTION: A tool pallet 8, following a last pallet 3 of a workpiece 2a being machined, is placed on a conveyer 1, followed by a pallet 3 with a workpiece 2b of a next model attached, and transferred all together. This tool pallet 8, holding a tool 7b for machining a next model with a tool holder 9, stops at a first stage S_1, puts a tool 7a which has been used for machining a previous model into an uppermost vacant tool holder, and then attaches a tool 7b in a 2nd stage automatically to a spindle head 6 by retraction, descent and advancement of an NC machining unit 4. Tools 7 of the 2nd and 3rd stations S_2 and S_3 are similarly changed by the advancement of the conveyer 1. Thus, an entire device can be simplified and there is no need for arranging a tool magazine for every NC machining unit.

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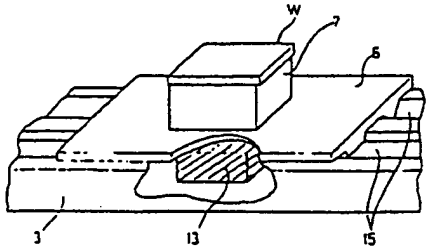
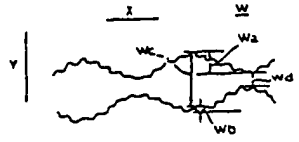
(54) METHOD OF MACHINING BEARING GUIDE SURFACE
(11) 62-136352 (A) (43) 19.6.1987 (19) JP
(21) Appl. No. 60-273494 (22) 6.12.1985
(71) AMADA CO LTD (72) GIYOKUCHIN CHIYOU(1) WATADA
(51) Int. Cl⁴. B24B1/00,B24B7/02





PURPOSE: To improve grinding work efficiency by driving a table of a grinding machine by means of a linear motor, performing grinding work by making the table vibrated in perpendicular directions caused by the variation in the feeding speed of the table, and performing elastic fluid lubrication process on a rugged surface formed by the grinding.

CONSTITUTION: When a table 5 of a surface grinder is driven with a linear motor 13 to perform grinding work with a grindstone on a workpiece W fixed with a magnetic chuck 7, the table 5 vibrates due to the variation in the feeding speed of the table in the directions perpendicular to the table feed to cause a phenomenon of forming a rugged surface on the ground surface. This ruggedness consists of a large ruggedness Wa and smaller ruggedness Wb. When the speed is small, a distance between the rugged surfaces Wa becomes narrower as Wd and when the speed is great, the distance becomes wider as Wc. On the other hand, ruggedness Wb is caused by the variation in the torque of the torque motor 13. An elastic fluid lubrication process is then applied on the rugged surface of the workpiece W. Thus, a bearing guide surface can be ground easily and accurately within a short period of work time without the need for scrapping work.

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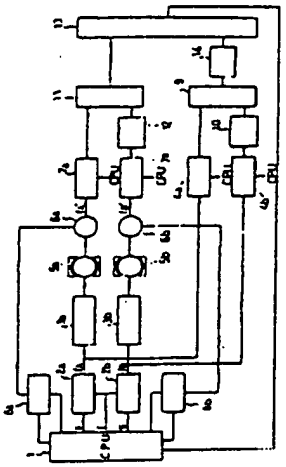
122 E 563

(54) SIMULTANEOUS CONTROL SYSTEM FOR MULTIPLE SHAFT
(11) 62-144589 (A) (43) 27.6.1987 (19) JP
(21) Appl. No. 60-286255 (22) 19.12.1985
(71) TOSHIBA CORP (72) YASUYUKI TSUJIHARA
(51) Int. Cl⁴. H02P5/50

PURPOSE: To simplify control system and improve control precision, by determining a rotational speed between respective motors, in relation to a speed ratio, and by controlling the motors to always make the speed ratio constant.

CONSTITUTION: A speed ratio on the observation side is fed from an adder 11 to an out-of-speed-ratio computing adder 13, and a speed ratio on the setting side is fed from an adder 9 to the out-of-speed-ratio computing adder 13 via a reversing circuit 14. By the adder 13, the difference of the speed ratio between servo-motors 5a, 5b is detected, and the result for input to a CPU1 is provided and is controlled to always make the speed ratio constant. To control shafts with the servo-motors 5a, 5b synchronously does not depend on the mutual speed itself, but depends on the speed ratio, and so if the speed ratio is always made constant and even if the speed of the respective servo-motors 5a, 5b is varied, there is no problem on biaxial synchronous control.

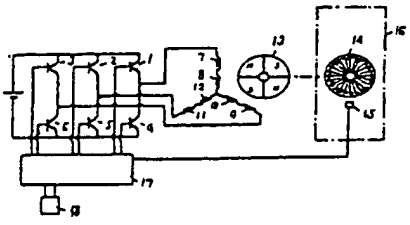


2a,2b: frequency dividing circuit, 3a,3b: servo-driver, 4a,4b,7b,8a,8b: counter, 7a: reference counter, 10,12: reversing

(54) COMMUTATORLESS MOTOR
(11) 62-144590 (A) (43) 27.6.1987 (19) JP
(21) Appl. No. 60-286123 (22) 19.12.1985
(71) MATSUSHITA SEIKO CO LTD (72) KANJI IZAKI(2)
(51) Int. Cl⁴. H02P6/02,H02K29/00

PURPOSE: To enable output to be increased on operation with simple organization, by detecting the position of a rotor, and by conducting current to the stator windings of two phases and three phases alternately.

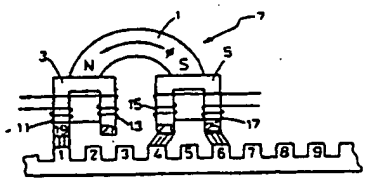
CONSTITUTION: The output ends of switching elements 1—6 are three-phase-bridge-connected, and are connected to the stator windings 7—12 of isolated neutral star connection. The position of a rotor 13 having magnetic poles is detected by a position detection means 16 consisting of a position detection plate 14 and an electromagnetic conversion element 15. By a control means 17, the switching elements 1—6 are controlled so that electrical conduction to the whole stator windings 7—12 and electrical conduction to two phases only among the windings of three phase may be alternately repeated.



(54) DRIVING METHOD FOR LINEAR PULSE MOTOR
(11) 62-144591 (A) (43) 27.6.1987 (19) JP
(21) Appl. No. 60-286520 (22) 19.12.1985
(71) AMADA CO LTD (72) MASAYA WATADA(1)
(51) Int. Cl⁴. H02P7/00

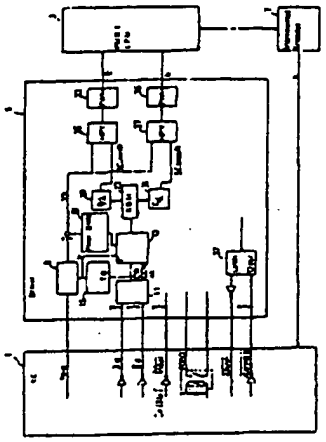
PURPOSE: To keep a static thrust constant and prevent unnecessary speed fluctuation from being generated, by linearizing the characteristic of exciting current.

CONSTITUTION: A mover 7 consisting of the first electromagnet 3 and the second electromagnet 5 combined with a permanent magnet 1 confronts a stator 9 in close contact with each other. The coils 11, 13 of the first electromagnet 3 are connected in series so that the polarities may be mutually opposite, and in the same manner, the coils 15, 17 of the second electromagnet 5 are also connected in series so that the polarities may be mutually opposite. Current is conducted to the coils 11—17 in order, and the mover 7 is rotated. Then, the exciting current of a static thrust/the characteristic of the exciting current linearized by the law of reciprocity of setting a thrust constant to be a value in no relation to the exciting current is fed.



(15)

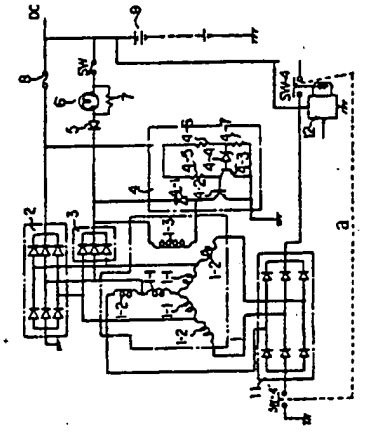
(54) FEEDBACK CONTROLLER FOR PULSE MOTOR
(11) 63-121497 (A) (43) 25.5.1988 (19) JP
(21) Appl. No. 61-264699 (22) 6.11.1986
(71) AMADA CO LTD (72) TSUTOMU MIZUNO(1) WATADA
(51) Int. Cl⁴. H02P8/00



PURPOSE: To effect highly accurate and high speed positioning, by a method wherein the feedback control of a pulse motor is effected by employing an incremental system position detector.

CONSTITUTION: An incremental system encoder 7 detects the moving position (mechanical angle) of a pulse motor 3 and feeds a detecting signal back to a NC device 1. The NC device 1 outputs a speed commanding signal V_{CMD} for a pulse motor 3, a feedback signal from the encoder 7, an initial point returning completion signal "Initial" or the like to a driver 5. The driver 5 provides respective phases of the pulse motor 3 with currents I_1, I_2. When a moving body is at the position of mechanical initial point, the initial point of table data, which specifies the synchronous control signal of the pulse motor, is adjusted at that position whereby the mechanical angle of the pulse motor 3 may be synchronized with the electric angle of the same.

(54) ALTERNATOR
(11) 63-121498 (A) (43) 25.5.1988 (19) JP
(21) Appl. No. 61-267960 (22) 11.11.1986
(71) SAWAFUJI ELECTRIC CO LTD (72) TAKESHI SONE
(51) Int. Cl⁴. H02P9/00

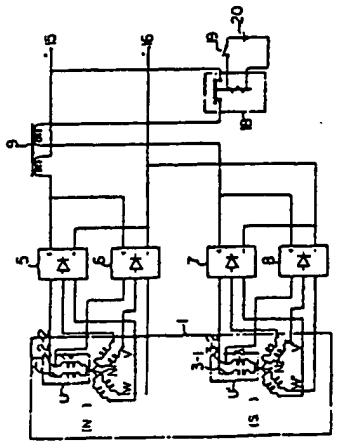


PURPOSE: To permit necessary outputs to be obtained upon low-speed rotation and high-speed rotation, by a method wherein an auxiliary coil is wound in series to a main coil to add it while the auxiliary coil is used when the rotating number of an alternator is lower than a predetermined value.

CONSTITUTION: An auxiliary coil 1-2 is connected in series to the main coil 1-1 of an alternator 1. When the rotating number of the alternator 1 is low, switches SW-4, SW-4' are put ON by a controller 12 and the outputs of the main coil 1-1 and the auxiliary coil 1-2 are supplied through a rectifying circuit 11. When the rotating number of the same becomes larger than the predetermined value, the switches SW-4, SW-4' are put OFF and only the output of the main coil 1-1 is supplied through the rectifying circuit 2. According to this method, a necessary output may be obtained upon low-speed operation and high-speed operation.

12: rotating number detecting signal, a: operated in conjunction with switch SW-4

(54) GENERATING SET FOR WELDING
(11) 63-121499 (A) (43) 25.5.1988 (19) JP
(21) Appl. No. 61-267961 (22) 11.11.1986
(71) SAWAFUJI ELECTRIC CO LTD (72) YOSHIHIRO KATO
(51) Int. Cl⁴. H02P9/00,H02K19/26



PURPOSE: To permit a weldable range to be spread to an area, in which a current is smaller, without providing the title set with a resistor for limiting current or a saturatable reactor, by a method wherein the output coil of a generator for welding is divided into a plurality of groups and the AC outputs of respective groups are synthesized properly.

CONSTITUTION: The output coil of a generator is divided into two groups S, N. The output coils U, V, W, U', V', W', which form one phase of the generator in respective groups, are connected in a form that two pieces of output coils are connected in parallel. A generated AC output is converted by diode stucks 5~8 into DC current. Upon welding, in which a large current is necessitated, the exciting current of the generator 1 is increased and a switch 18 is turned ON to synthesize the output current of a generator at N side and S side. When the welding is effected by a small current, the exciting current is weakened and the switch 18 is turned OFF whereby only the output current of the generator at N-side may be supplied.

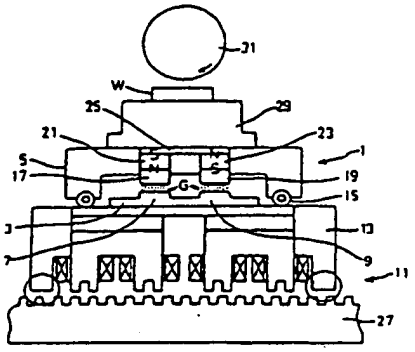
(19)

58 E 731

#18 (54) OSCILLATION-PROOF APPARATUS FOR LINEAR PULSE MOTOR
(11) 63-287357 (A) (43) 24.11.1988 (19) JP
(21) Appl. No. 62-121118 (22) 20.5.1987
(71) AMADA CO LTD (72) GIYOKUSHIN CHIYOU(2), WATADA
(51) Int. Cl⁴. H02K41/03

PURPOSE: To prevent a linear motor from being oscillated and stepped out, by arranging a plurality of salient poles fixed on a mover, and salient poles magnetized by the permanent magnets of a moving member, confronted with each other, with a void inbetween.

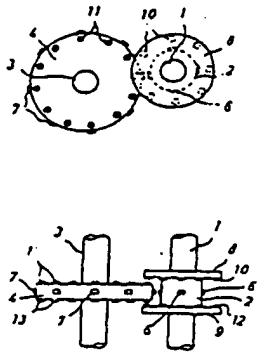
CONSTITUTION: The oscillation-proof apparatus 1 of a linear pulse motor(LPM) is composed of a stationary member 3 and a moving member 5. The stationary member 3 is made of a magnetic substance and is provided with two salient poles 7, 9, and is fixed on the upper surface of the primary side mover 13 of the permanent magnet type four-pole LPM 11. The moving member 5 is supported to move horizontally on the upper surface of said mover 13 by four rollers 15, and near the central section, salient poles 17, 19 magnetized by permanent magnets 21, 23 are arranged. Accordingly, the salient poles 17, 19 of the moving member 5 are confronted with the salient poles 7, 9 of the stationary member 3, respectively with gaps G inbetween. As a result, so far as the primary side mover 13 is concerned, the moving member 5 does not follow up the oscillation of frequency higher than normal pulse rate, and the oscillation is interrupted.



(54) POWER TRANSMISSION SYSTEM
(11) 63-287358 (A) (43) 24.11.1988 (19) JP
(21) Appl. No. 62-119011 (22) 18.5.1987
(71) ISHIKAWAJIMA HARIMA HEAVY IND CO LTD (72) YOSHIYUKI IDE
(51) Int. Cl⁴. H02K49/10,F16H49/00

PURPOSE: To operate a device with low oscillation and low noise, by transmitting the rotational force of a driving wheel to a driven wheel, with the mutual attractions of permanent magnets fitted respectively on the outer peripheries of the driving wheel and the driven wheel.

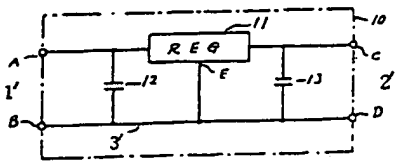
CONSTITUTION: On a driving shaft 1, a driving wheel 2 is integrally fitted, and at a position with a specified distance from the driving shaft 1, a driven shaft 3 in parallel with the driving shaft 1 is rotatably supported via a bearing. On the driven shaft 3, a driven wheel 4 is integrally fitted in a state separated properly from the driving wheel 2, at a position confronted with the driving wheel 2. On the respective outer peripheral surfaces of both the wheels 2, 4, the permanent magnets 6, 7 of different poles consisting of mutually attracted poles N, S are fitted at the same pitch. As a result, a rotational force can be transmitted to the driven shaft 3 from the driving shaft 1.



(54) SPIKE VOLTAGE STEP-DOWN CIRCUIT
(11) 63-287359 (A) (43) 24.11.1988 (19) JP
(21) Appl. No. 62-121572 (22) 18.5.1987
(71) NEC CORP (72) MASAHIRO FUWA(1)
(51) Int. Cl⁴. H02M1/14

PURPOSE: To step-down spike voltage, by connecting a series type output voltage stabilizing power circuit and this input/output capacitor, between the output terminal of a DC power source and the power input terminal of an electronic circuit.

CONSTITUTION: A spike voltage reducing circuit 10 has a series type output voltage stabilizing power circuit (REG) 11 connected between an input side terminal A and an output side terminal C, a capacitor 12 connected between input terminals A, B, and a capacitor 13 connected between output terminals C, D; to a common line to which the input terminal B and the output terminal D are connected, the earthing terminal E of the REG 11 is connected to compose the circuit 10. As a result, spike voltage to an electronic circuit package at the time of activation insertion can be stepped down. Then, the time up to a steady-state value can be extremely shortened.



2C

1: input side 2: output side 3: common line

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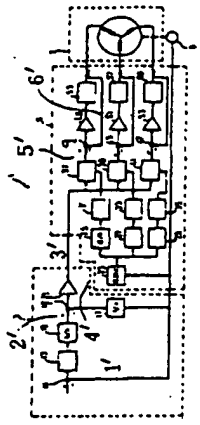
(54) DRIVING DEVICE FOR SYNCHRONOUS SERVOMOTOR
(11) 1-50791 (A) (43) 27.2.1989 (19) JP
(21) Appl. No. 62-206559 (22) 21.8.1987
(71) AMADA CO LTD (72) MASAYA WATADA(2)
(51) Int. Cl⁴. H02P7/622,H02P6/00

PURPOSE: To prevent current from being lowered at the time of starting and high-speed operation, by setting a phase advancement compensating circuit for advancing the phase of the current according to the speed of a motor.

CONSTITUTION: By a controller 3, speed command and speed feedback signal according to a deviation between position command and position feedback signal are compared with each other, and the output of thrust command is generated. By a ROM 23, according to the output signal of an encoder 9, three-phase sine wave signal is read out, and via a D/A converter and a phase compensating circuit, the output is generated Then, by multipliers 37, 39, 41, the thrust command and three-phase sine wave are multiplied by each other, and the output of current command is generated. By current amplifiers 49, 45, 47, according to a deviation between the current command and current feedback signal, PWM circuits 55, 57, 59 are controlled. As a result, the current can be prevented from being lowered at the time of the starting and high-speed operation of a servomotor.

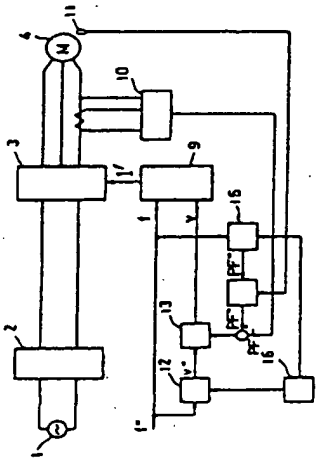


1: servomotor controlling system, 5: driving gear, 7: synchronous servo motor, 11: position command, 13: deviation counter, 21: speed amplifier, 31: phase compensating circuit, 1': position feedback, 2': speed command, 3': thrust command, 4': speed feedback, 5': current command, 6': current feedback

(54) INVERTER
(11) 1-50792 (A) (43) 27.2.1989 (19) JP
(21) Appl. No. 62-205908 (22) 19.8.1987
(71) MITSUBISHI ELECTRIC CORP (72) SHOJI MOCHIZUKI(1)
(51) Int. Cl⁴. H02P7/63

PURPOSE: To enable a motor to be always driven at the highest efficiency point, by comparing a detection power-factor at the time of driving the motor, with a previously stored optimum power-factor value, and by controlling output voltage.

CONSTITUTION: From a reference voltage setting unit 12, the output of reference voltage V according to desired frequency f is generated, and from a reference power-factor generator 15, the output of a reference power-factor PF' is generated according to the frequency f. In this case, the V/F pattern and optimum power-factor pattern of the output voltage and frequency are stored on memory. Besides, by a temperature correcting device 14, according to the detection value of a temperature detector 11, the reference power-factor PF' is corrected. In the meantime, by a power-factor detector 10, a power-factor PF at the time of driving a motor is detected. Then, by an output voltage correcting device 13, according to a difference component between the reference power-factor PF' and the detected power-factor PF, the reference voltage V is corrected. By a PWM signal generator 9, according to the set frequency f and voltage V of provided input, a switching element 3 is driven.

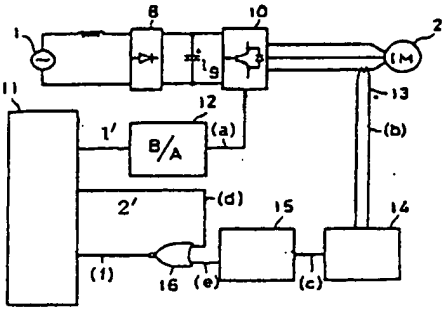


2: converter, 1': PWM signal

(54) INVERTER
(11) 1-50793 (A) (43) 27.2.1989 (19) JP
(21) Appl. No. 62-205909 (22) 19.8.1987
(71) MITSUBISHI ELECTRIC CORP (72) TAKAHIRO ISHIGAMI(1)
(51) Int. Cl⁴. H02P7/63

PURPOSE: To enable the power-factor phase angle of a load motor to be detected with simple circuit composition, by obtaining the logical product by voltage phase signal and current phase signal, and by detecting the power-factor phase angle.

CONSTITUTION: From a micro computer 11, PWM signal is applied to a power converter 10 via a base amplifier circuit 12. Besides, from the PWM signal, the output of the phase voltage waveform signal of an induction motor 2 is generated. In the meantime, from a phase detector 15, through the detection signal of a current sensor 13 via a filter circuit 14, the output of phase current signal is generated. Then, the input of voltage phase signal and current phase signal to a logical circuit 16 is provided, and a phase difference between both ones is obtained by pulse signal. By the micro computer 11, this phase difference signal is read as power-factor phase angle signal, and based on the power-factor phase angle signal, output voltage is controlled.



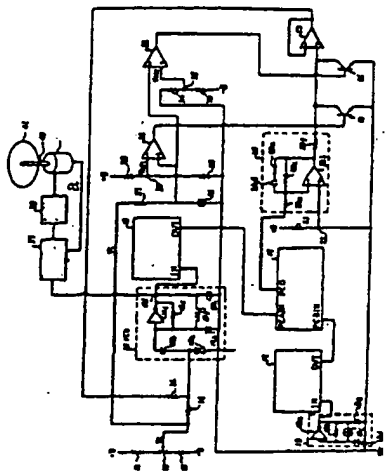
(21)

(54) SPEED CONTROLLER FOR ROTARY MACHINE

(11) 1-64578 (A) (43) 10.3.1989 (19) JP
(21) Appl. No. 62-221081 (22) 3.9.1987
(71) SONY CORP (72) NOBUYUKI OKA
(51) Int. Cl⁴. H02P5/00

PURPOSE: To permit a highly accurate speed control and a continuous variable speed control, by a method wherein a PLL loop filter is opened and closed by the result of the comparison between the output of a variable resistor, controlling a voltage control type oscillator, and the reference value of the same.

CONSTITUTION: A voltage control type oscillator 15 provides a frequency divider 16 with the output having a frequency in accordance with the output of a variable resistor 11. A phase comparator 17 compares the output of a reference oscillator 18 with the output of the frequency divider 16 while an output signal is fed back to the voltage control type oscillator 15 through a low-pass filter 20 and a buffer amplifier 23. Voltage comparators 25, 32 put transistors 31, 36 ON when the output of the variable resistor 11 is between a reference value VRP1 and another reference value VRP2. The transistor 31 or the transistor 36 is put ON when the output of the variable resistor 11 is higher than the reference value VRP1 or lower than the reference value VRP2 whereby the output may become proportional to the output of the variable resistor 11.



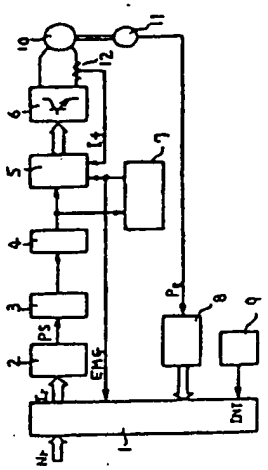
26,32: voltage comparator, 37: speed and phase servo circuit, 38: driving circuit, 39: spindle motor, 41: disc, a: output of enchogenerator

(54) FAULT DETECTOR FOR MOTOR CONTROLLER

(11) 1-64579 (A) (43) 10.3.1989 (19) JP
(21) Appl. No. 62-217939 (22) 2.9.1987
(71) HITACHI LTD (72) MASAHIKO WATANABE(3)
(51) Int. Cl⁴. H02P5/00

PURPOSE: To prevent a motor from running at excessive speeds, by judging that something unusual has happened, when no pulse width modulation signal is received within one period of said pulse width modulation signal.

CONSTITUTION: A microcomputer 1 conducts a speed control operation with every given period by the use of a speed command Nr and a speed feedback signal Pe, to output a current command Ir. A pulse width modulation circuit 2 converts said current command Ir into a pulse width modulation signal PS to transmit it from a transmission circuit 3. A receiving circuit 4 outputs a received pulse width modulation signal to a current control circuit 5. In this case, a pulse decision circuit 7 judges that something unusual has happened, when no pulse width modulation signal is received within one period of said pulse width modulation signal, and stops the current control circuit 5.

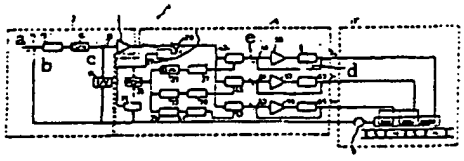


(54) DRIVING METHOD FOR LINEAR THREE-PHASE SYNCHRONOUS MOTOR

(11) 1-64580 (A) (43) 10.3.1989 (19) JP
(21) Appl. No. 62-216295 (22) 1.9.1987
(71) AMADA CO LTD (72) TSUTOMU MIZUNO(1) WATADA
(51) Int. Cl⁴. H02P5/00

PURPOSE: To make a magnetic sensor unnecessary by causing a cosine wave current having a given phase and the same magnitude to flow through two windings out of three-phase windings at the time of starting an apparatus and thereafter applying a given three-phase AC.

CONSTITUTION: When power is applied at the time of starting an apparatus, an initializing circuit 27 specifies the address of ROM 25 so that said ROM supplies a cosine current having a given phase in the phase U and phase V of a linear three-phase synchronous motor and the same magnitude. Further, said circuit 27 outputs a thrust command to an adder 29. Thus, a movable element equipped with a primary side winding is positioned at a constant place relative to a secondary side magnetic pole. After that, a current output command is stopped and a counter 23 is preset. Then, a speed command is outputted to a comparator 19 to start the motor to operate a position feedback loop.



(22)

1: linear three-phase synchronous motor control system, 3: controller, 5: driver, 6: PWM circuit, 9: encoder, 13: deviation counter, 21: speed amplifier, 37: phase compensation circuit, 43: multiplier, 55: current amplifier, a: position command, b: position feedback, c: speed feedback, d: current feedback, e: current command